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Insight into the electrical conductivity of quark gluon plasma through photon production

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Heavy-ion collisions have been used to study quark-gluon plasma (QGP) and can be used to study strong electromagnetic (EM) fields. Because the EM fields penetrate the QGP medium, their evolutions are coupled together. In turn, both contribute to the production of photons [1, 2]. Usually, the EM field modifications are considered separately from the evolution of the QGP. Instead, we model the dynamic evolution of the QGP and EM fields together using relativistic resistive magneto-hydrodynamics (RRMHD) [2]. Our RRMHD model is unique for heavy-ion collisions because it includes a finite scalar electrical conductivity. That conductivity acts as a dissipative correction in the distribution function of QGP, similar to viscosity. This alters the yield and flow of photons, and results in energy loss for jets. We will give a detailed discussion on how our RRMHD model is connected to the EM dissipative corrections of QGP. Also, we will introduce some possible methods to study the electrical conductivity of QGP.

[1] Sun and Yan, Phys. Rev.C 109, 034917 (2024)

[2] K. Tuchin, Advances in High Energy Physics 2013, 1 (2013)

[3] Nakamura, Miyoshi, Nonaka, and Takahashi, Phys.Rev.C 107, 014901 (2023)

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Category

Theory

Collaboration

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